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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/566,804	01/30/2006	David Ziger	US03 0244 US2	8019
65913	7550	10/17/2008		
NXP, B.V. NXP INTELLECTUAL PROPERTY DEPARTMENT M/S41-SJ 1109 MCKAY DRIVE SAN JOSE, CA 95131			EXAMINER JELSM, JONATHAN G	
			ART UNIT	PAPER NUMBER
			1795	
			NOTIFICATION DATE	DELIVERY MODE
			10/17/2008	ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ip.department.us@nxp.com

### Office Action Summary

**Application No.**

10/566,804

**Applicant(s)**

ZIGER ET AL.

**Examiner**

Jonathan Jelsma

**Art Unit**

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 30 January 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 7-13 is/are rejected.
- 7) ☒ Claim(s) 4-6 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 January 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/S508)  
Paper No(s)/Mail Date 01/30/2006
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Summary***

1. This is the initial office action based on application 10/566,804 filed on 01/30/2006 by David Ziger, and Pierre Leroux.
2. Claims 1-13 are currently pending and have been fully considered.

### ***Drawings***

3. The drawings are objected to under 37 CFR 1.83(b) because they are incomplete. 37 CFR 1.83(b) reads as follows:

When the invention consists of an improvement on an old machine the drawing must when possible exhibit, in one or more views, the improved portion itself, disconnected from the old structure, and also in another view, so much only of the old structure as will suffice to show the connection of the invention therewith.

4. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or

"New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

5. Figures 6 and 7 show a method without the corresponding description of the method steps in the boxes.

***Claim Rejections - 35 USC § 112***

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 1-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

8. Claims 1, 7-8, and 10 recite the limitation "opposite corner" in line 7 of claim 1, line 6 of claim 7, line 3 of claim 8, and line 6 of claim 10. There is insufficient antecedent basis for this limitation in the claim. The opposite corner refers to the clear field mask, but it is not clear as to what the "opposite corner" is opposite to.

***Claim Rejections - 35 USC § 102***

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claims 12-13 are rejected under 35 U.S.C. 102(b) as being anticipated by BOWES (US 2002/0182516 A1).

11. BOWES teaches a mask set 1000A and 1000B comprising a dark field mask, 1000A, and a clear field mask, 1000B (Fig. 10). The dark field mask may comprise a first part of a pattern, 1002 (Fig. 10), these patterns are needle patterns used to determine line width due to the effects of aberrations, such as flare (paragraph 0036). The dark field mask includes a first portion of a box-in-a-box correction pattern, 104 (Fig. 10), and a first portion of an analogous focus box pattern, 106 (Fig. 10). The clear field mask, 1000B, has the complementary, and align able, box-in-a-box and focus box patterns, as well as the complementary portions of the flare patterns (Fig. 10). The combined first mask 1000A and second mask 1000B may be on a single mask 1000 (Fig. 10).

***Claim Rejections - 35 USC § 103***

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

14. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ki (US 2003/0068565 A1) in view of BOWES (US 2002/0182516 A1).

15. Ki teaches a method of determining the effect of flare on the line widths of photoresist patterns (paragraph 0024). The line widths of photoresist patterns formed by a line and space pattern of a dark field mask are compared with the line widths of a clear field mask (paragraph 0024). The amount of flare is calculated based on the difference between the dark field and the clear field mask photoresist patterns (paragraph 0024). A first mask comprising a light shielding layer with light transmission patterns, where the line widths of the line patterns are the same, goes through a first photolithographic process, using an exposure apparatus (paragraphs 0047 – 0049). The first mask is then disposed above a wafer coated with a photoresist, and the first photolithographic process is performed (paragraph 0049). A second mask, which comprises a clear field mask, has light transmission region, with light shielding regions forming the pattern (paragraph 0054). A second photolithographic process is performed using the second mask, by projecting the image of the second mask onto a photoresist coated wafer, which may be the same wafer as used during the first exposure (paragraph 0056). The exposed portions of both the first photoresist pattern and the second photoresist patterns are developed and measured (paragraphs 0050 – 0051, and 0057-0058). The measurement may be done using a scanning electron

microscope (paragraph 0057). The difference in line widths of the first and second photoresist patterns are determined, and the difference is the result of flare (paragraph 0058). The effect of flare may be determined using for example a computer program (paragraph 0060). Additionally as can be seen in Figure 6 the second mask pattern may be a composite pattern, including both clear field and dark field mask pattern regions. As can be seen in Figure 13, the pattern regions of the second mask, may be located in the corners of the main mask area.

16. Ki does not explicitly teach forming on the first mask the mask pattern being in the corner, or that the second mask has the pattern in the opposite corner. However, Ki does teach that the design of the patterns may be such, that the patterns are located in the areas where flare is measured (paragraph 0083). Therefore, at the time of the invention one having ordinary skill in the art would have been motivated to arrange the mask patterns in suitable locations, such as opposite relative corners, as a matter of routine experimentation, in order to design the mask so that the flare measurement patterns are located in the proper area to measure the flare.

17. Additionally Ki does not explicitly teach the first and second exposure in one die position, and the composite pattern exposure in a second die position. Ki does teach that the second exposure may be done on the same wafer, which may be interpreted as the same die position, and also that a new test wafer may be used, where the second test wafer may correspond to a second die position (paragraph 0056). At the time of the invention one having ordinary skill in the art would have been motivated utilize the first and second wafers, as different die positions during the exposures as a matter of

routine experimentation, since KI teaches both the use of one wafer, and two wafers for the exposure.

18. KI does not explicitly teach the first pattern contains a correction box or a focus box pattern. However, BOWES teaches a first portion of a box-in-a-box correction pattern, 104 (Fig. 10), and a first portion of an analogous focus box pattern, 106 (Fig. 10).

19. At the time of the invention one having ordinary skill in the art would have been motivated to include the box-in-a-box and focus box patterns of BOWES in the mask and method of KI, so that both the measurements of the pattern, and measurement of the alignment of the patterns may be determined in the same step (BOWES paragraph 0017).

20. Claims 7- 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ki (US 2003/0068565 A1).

21. KI teaches a method of determining the effect of flare on the line widths of photoresist patterns (paragraph 0024). The line widths of photoresist patterns formed by a line and space pattern of a dark field mask are compared with the line widths of a clear field mask (paragraph 0024). The amount of flare is calculated based on the difference between the dark field and the clear field mask photoresist patterns (paragraph 0024). A first mask comprising a light shielding layer with light transmission patterns, where the line widths of the line patterns are the same, goes through a first photolithographic process, using an exposure apparatus (paragraphs 0047 – 0049).



The first mask is then disposed above a wafer coated with a photoresist, and the first photolithographic process is performed (paragraph 0049). A second mask, which comprises a clear field mask, has light transmission region, with light shielding regions forming the pattern (paragraph 0054). A second photolithographic process is performed using the second mask, by projecting the image of the second mask onto a photoresist coated wafer, which may be the same wafer as used during the first exposure (paragraph 0056). The exposed portions of both the first photoresist pattern and the second photoresist patterns are developed and measured (paragraphs 0050 – 0051, and 0057-0058). The measurement may be done using a scanning electron microscope (paragraph 0057). The difference in line widths of the first and second photoresist patterns are determined, and the difference is the result of flare (paragraph 0058). The effect of flare may be determined using for example a computer program (paragraph 0060). Additionally as can be seen in Figure 6 the second mask pattern may be a composite pattern, including both clear field and dark field mask pattern regions. As can be seen in Figure 13, the pattern regions of the second mask, may be located in the corners of the main mask area.

22. KI does not explicitly teach forming on the first mask the mask pattern being in the corner, or that the second mask has the pattern in the opposite corner. However, KI does teach that the design of the patterns may be such, that the patterns are located in the areas where flare is measured (paragraph 0083). Therefore, at the time of the invention one having ordinary skill in the art would have been motivated to arrange the mask patterns in suitable locations, such as opposite relative corners, as a matter of

routine experimentation, in order to design the mask so that the flare measurement patterns are located in the proper area to measure the flare.

23. Additionally KI does not explicitly teach the first and second exposure in one die position, and the composite pattern exposure in a second die position. KI does teach that the second exposure may be done on the same wafer, which may be interpreted as the same die position, and also that a new test wafer may be used, where the second test wafer may correspond to a second die position (paragraph 0056). At the time of the invention one having ordinary skill in the art would have been motivated utilize the first and second wafers, as different die positions during the exposures as a matter of routine experimentation, since KI teaches both the use of one wafer, and two wafers for the exposure.

***Allowable Subject Matter***

24. Claims 4-6 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

25. The following is a statement of reasons for the indication of allowable subject matter: The prior art of record does not teach or suggest that the effect of flare is calculated in an X-direction for the difference between a right leg and a left leg, and from the Y-direction for the effect of flare from a top leg and bottom leg of the printed feature.

**Conclusion**

26. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Jelsma whose telephone number is (571)270-5127. The examiner can normally be reached on Monday to Thursday 7:00 a.m. - 5:00 p.m.

27. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on (571)272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

28. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Mark F. Huff/  
Supervisory Patent Examiner, Art Unit 1795

JGJ